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Self-Reported Behavioral Health Habits and Other Health Issues Influencing Capabilities and Mission Readiness of Combat Search and Rescue Personnel

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14. ABSTRACT

U.S. Air Force (USAF) combat search and rescue (CSAR) fixed- and rotary-wing aircrew special duty rescue personnel are highly trained airmen operating across the globe in a wide range of Department of Defense and Joint Military Coalition combat rescue and recovery missions. The health and wellness of such aircrew and special duty operators are critical to sustaining warfigther performance and readiness capabilities. As a result, the USAF School of Aerospace Medicine was requested by USAF line operator and medical leadership to conduct a field survey to assess for general areas of health-related behaviors (i.e., sleep and exercise; alcohol, tobacco, and caffeine use; common reasons for seeking medical care and mental health support services; and reasons for increased prescription and over-the-counter medication usage) relevant to understanding the needs and issues specific to this community. A total of 123 CSAR aircrew and 298 special duty rescue personnel from multiple squadrons across three USAF major commands completed the web-based survey, resulting in a 32% response rate. Statistical analyses were performed to assess for between-group differences to quantitative and qualitative items assessing (a) the amount of sleep obtained before work and the frequency of engaging in structured physical exercise throughout the week; (b) the amount, frequency**,** and increase in consumption of alcohol, tobacco, and caffeine/energy supplements and the reasons for increased consumption; (c) medical conditions worsened by current unit assignment and occupational stress; (d) changes in healthcare utilization since being assigned to CSAR operations and the reasons for these changes; and finally (e) increases in medication utilization since being assigned to CSAR operations and the reasons for such increases. A number of recommendations throughout the discussion section are provided for line and medical leadership for optimizing health for CSAR operators.

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TABLE OF CONTENTS

Section **Page**

TABLE OF CONTENTS (concluded)

Section **Page**

LIST OF TABLES

Page

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1.0 SUMMARY

U.S. Air Force (USAF) combat search and rescue (CSAR) fixed- and rotary-wing aircrew special duty rescue personnel are highly trained airmen operating across the globe in a wide range of Department of Defense and Joint Military Coalition combat rescue and recovery missions. The health and wellness of such aircrew and special duty operators are critical to sustaining warfigther performance and readiness capabilities. As a result, the USAF School of Aerospace Medicine was requested by USAF line operator and medical leadership to conduct a field survey to assess for general areas of health-related behaviors (i.e., sleep and exercise; alcohol, tobacco, and caffeine use; common reasons for seeking medical care and mental health support services; and reasons for increased prescription and over-the-counter medication usage) relevant to understanding the needs and issues specific to this community. A total of 123 CSAR aircrew and 298 special duty rescue personnel from multiple squadrons across three USAF major commands completed the web-based survey, resulting in a 32% response rate. Statistical analyses were performed to assess for between-group differences to quantitative and qualitative items assessing (a) the amount of sleep obtained before work and the frequency of engaging in structured physical exercise throughout the week; (b) the amount, frequency**,** and increase in consumption of alcohol, tobacco, and caffeine/energy supplements and the reasons for increased consumption; (c) medical conditions worsened by current unit assignment and occupational stress; (d) changes in healthcare utilization since being assigned to CSAR operations and the reasons for these changes; and finally (e) increases in medication utilization since being assigned to CSAR operations and the reasons for such increases. A number of recommendations throughout the discussion section are provided for line and medical leadership for optimizing health for CSAR operators.

2.0 INTRODUCTION

U.S. Air Force (USAF) combat search and rescue (CSAR) fixed- and rotary-wing aircrew (e.g., pilots, flight engineers, aerial gunners) and special duty rescue personnel (e.g., enlisted pararescuemen and combat rescue officers) are highly trained airmen operating under high-demand, high-risk conditions across the globe in a wide range of combat and humanitarian operations. They are an elite group of military personnel critical to Department of Defense and Joint Military Coalition combat rescue and recovery missions.

CSAR personnel serve as both combatants and personnel recovery specialists. They deploy to a wide range of geographical conditions (e.g., land and sea) into restricted environments to authenticate, extract, treat, and/or stabilize and rescue injured, wounded, isolated, captured, or killed personnel, as well as recover sensitive information and equipment. Although the CSAR mission was initially designed to recover downed or distressed U.S. military personnel during both combat and non-combat operations [1], over the past decade CSAR aircrew and rescue personnel have maintained a high operational tempo across multiple areas of conflict (such as Africa, Afghanistan, and Iraq) in support of on-going military operations [2].

USAF CSAR missions represent a moral and ethical imperative during battlefield and humanitarian operations. While other services (i.e., Army, Navy, Marine Corps) engage in personnel recovery and humanitarian missions, the USAF is the only service with forces dedicated entirely to CSAR. Whether stranded by downed aircraft, surrounded by a hostile enemy, or abducted by terrorists, isolated military personnel rely on USAF CSAR personnel to

conduct operations across the spectrum of conflict. Such missions are inherently high risk. The USAF is committed to leaving no one behind – a commitment that gives all members of the joint and coalition team the confidence to perform vital work in hostile and uncertain circumstances. The USAF maintains both fixed-wing HC-130P and rotary-wing HH-60G airframes to accomplish CSAR missions [2].

There are multiple aircrew positions within the HC-130P, including pilot, co-pilot, navigator, flight engineer, airborne communication specialist, and loadmaster. The fixed-wing HC-130P aircraft is capable of long-range, medium-to-low altitude missions in a "no-to-low" threat environment, day or night. The HC-130P also provides airdrops of people and equipment, as well as limited command and control link for rescue assets during a CSAR mission. The aircraft has fully integrated inertial navigation and global positioning systems and night vision goggle compatible interior and exterior lighting. It also has forward-looking infrared, radar, and missile warning receivers; chaff and flare dispensers; and satellite and data-burst communications. The HC-130P also extends the range of the rescue helicopter by providing in-flight air refueling.

Aircrew positions within the HH-60G include a pilot, flight engineer, and gunner. The rotary-wing HH-60G Pave Hawk helicopter is capable of air refueling and operating at low altitude in a wide array of geographical conditions and operating in a medium threat environment and includes an automatic flight control system and night vision goggles with lighting and forward-looking infrared system that greatly enhances night low-level operations. Additionally, the aircraft has color weather radar and an engine/rotor blade anti-ice system that gives the HH-60G an adverse weather capability. The HH-60G includes a retractable in-flight refueling probe, internal auxiliary fuel tanks, two 7.62-mm or .50-caliber machine guns, and an 8,000-pound (3,600-kg) capacity cargo hook. To improve air transportability and shipboard operations, all HH-60Gs have folding rotor blades. The aircraft also has a radar warning receiver, infrared jammer, and flare/chaff countermeasure dispensing system, as well as a hoist capable of lifting a 600-pound load (270 kg) from a hover height of 200 feet (60.7 meters) and a personnel locating system that provides range and bearing information to a survivor's location.

Aircrew on both fixed- and rotary-wing aircraft are accompanied by rescue military personnel commonly referred to as "Guardian Angels," who are highly trained and equipped special duty rescue operators known as pararescue specialists (aka PJs) and combat rescue officers (CROs). Such military personnel specialize in recovery and medical treatment of wounded or killed personnel. PJs and CROs serve as the critical "link" between recovering isolated personnel on land and sea and the rescue platforms. They can also operate independent of aircraft for extended periods. PJs and CROs are arguably some of the most advanced, elite military special duty operators worldwide. Due to the extreme nature of tasks and challenging conditions, CSAR personnel are expected to adapt, and they are required to maintain a high level of psychological fitness and readiness. The relatively high-risk, high-demand conditions require a robust set of behavioral health habits to sustain the physical and psychological stamina needed to adapt to both training and operational requirements.

Furthermore, both aircrew and special duty rescue operators must meet aeromedical standards that are much higher than traditional medical fitness-for-duty standards. Such standards require CSAR personnel to sustain a high level of physical and psychological functioning. To sustain such standards, they are presumed to engage in a robust set of behavioral health habits (e.g., sleep, exercise, dietary intake) to recover from demanding conditions, as well

as bolster resilience to stress-related disorders. However, there are limited data available regarding specific behavioral health habits of such a unique group of military personnel.

Over the past few years, USAF medical leadership has attempted to modernize aeromedical capability to provide precision-based health and performance interventions by embedding providers (i.e., operational medicine physicians, psychologists, physical therapists, etc.) within such units. The purpose of embedding such support is to increase access to specially trained providers equipped to provide individually tailored health and human performance strategies to expedite recovery from injury/illness and/or improve general health and performance. Having situational awareness of the behavioral health habits of CSAR aircrew and special duty rescue operators is essential to ensure the effective delivery of health and human performance initiatives.

Although an exhaustive list of behavioral health habits is beyond the scope of this study, areas of concern described by both CSAR operators and medical leadership include sleep, exercise, alcohol consumption, tobacco use, caffeine and energy beverage consumption, as well as utilization of healthcare services (medical, mental health, and alternative healthcare) and medication (prescription, as well as over-the-counter (OTC)) as compensatory strategies for sustaining health and managing stress. There are also concerns regarding medical conditions exacerbated by CSAR duties and occupational stress.

However, obtaining such data on CSAR personnel is relatively difficult. Analyzing medical records and encounters of CSAR personnel may not provide an accurate "picture" of the issues due to lack of self-reporting of medical and mental health difficulties and problematic behavioral health habits within this community. As a result, any efforts to evaluate such conditions will need to consider methods that maximize self-disclosure to obtain accurate data and "true prevalence" rate of specific behavioral health behaviors and related conditions.

The purpose of this study is to identify the frequency of health behaviors of USAF CSAR personnel, as well as self-reported differences between CSAR aircrew and special duty rescue personnel on the following:

- Demographics and occupational variables
- The frequency of health behaviors regarding the amount of sleep obtained before work and the frequency of engaging in structured physical exercise throughout the week
- The amount, frequency, and increase in consumption of alcohol, tobacco, and caffeine (use of traditional and designer energy drinks) and the reasons for increased consumption
- Medical conditions worsened by current unit assignment and occupational stress
- Changes in healthcare utilization (such as medical care, mental health, and alternative health provider services) since being assigned to their current duties and the reasons for these changes
- Increases in medication utilization (i.e., prescription and OTC) since being assigned to their current duties and the reasons for such increases

Investigating the health behaviors and healthcare utilization trends for CSAR personnel will provide line and medical leadership with an additional source of information to better understand the health habits and needs for CSAR personnel. This information will aid in the development of force management strategies for optimizing health and performance and may assist embedded medical and mental health providers with understanding the frequency and prevalence of problematic behavioral health habits through the CSAR community.

3.0 METHODS

3.1 Participants

A total of 123 aircrew (i.e., helicopter pilots, flight engineers, aerial gunners) and 298 special duty rescue personnel (PJs and CROs) participated in the study. The total number of aircrew and special duty rescue personnel was obtained from USAF operational leadership. This number was tcompared with the number of personnel who participated in the study to obtain an overall response rate for each group. The response rate was 32%: 26% for aircrew and 43% for special duty rescue personnel.

3.2 Questionnaire

The first part of the survey included demographic items that assessed respondents' gender, age range, marital status, and number of children dependents living at home. This section also contained operational items that assessed unit of assignment, duty position, rank range, length of time serving as a CSAR operator, average number of hours worked in a typical week, and current work schedule. This section of the questionnaire was designed so that no identifiable personal information was obtained to maintain anonymity for respondents. This was done to encourage genuine self-disclosure in a community where there may be strong cultural stigmas (and concerns for negative career implications) regarding medical or mental health problems.

The second part of the survey consisted of questions designed to assess sleep and physical exercise health behaviors; alcohol, tobacco, and caffeinated beverage use; medical conditions created or made worse by current unit assignment; medical, mental health support, and alternative healthcare utilization; and prescription and OTC medication utilization. The Appendix contains a list of the items and response options.

3.3 Procedure

Participation was encouraged by CSAR line leadership from Air Force Headquarters via invitations that were sent to CSAR personnel throughout the Air Combat Command, Air Force Special Operations Command, Air National Guard, and USAF Reserves via their USAF e-mail accounts. The mass e-mail invitation to participate informed personnel that participation was voluntary and anonymous. Line leadership invitations to participate included statements that clarified the purpose of the survey was to gain a better understanding of the health habits and behaviors of CSAR personnel to identify areas to improve health and morale.

The group e-mail invitation to participate had an internet link to the USAF School of Aerospace Medicine web-based survey. The introductory script included statements the study was conducted by independent researchers and participation was voluntary and anonymous. The introductory page also gave the nature, purpose, and instructions of the study and informed participants that operational leadership would not have access to individual responses and results would be presented in a summarized format at the squadron level. It was also communicated to participants that they could withdraw at any time without negative repercussions. The web page also had a list of local and aeromedical psychologist points of contact if a participant had questions or concerns related to his or her health and well-being. Participants were encouraged to

contact the point of contact at their location if they were interested in discussing their health, especially if any items on the survey raised personal concerns.

Before participants could begin the electronic survey, they were asked if they understood the nature, purpose, and instructions of the survey and were voluntarily consenting to participate. Those who endorsed "yes" were then allowed to proceed and take the survey. Those who endorsed "no" were not given the survey and were redirected to another web page that instructed them how to contact the independent researchers of the study for additional information. Seventeen individuals declined participation after reading the informed consent section of the introductory web page for the survey.

The survey was distributed electronically via a Department of Defense-approved electronic survey tool. Respondents completed the survey online. In general, it took respondents 25 to 30 minutes to complete the survey. After completing the survey, respondents were instructed on how to obtain the general results of the study and when such information would be available.

3.4 Data Analysis

Alcohol consumption thresholds were computed using the Audit-C. The Audit-C is a three-item alcohol misuse screen that identifies individuals who are hazardous drinkers or may have active alcohol use disorders. Each item is scored on a scale of 0-4, and the total Audit-C score is on a scale of 0-12. The thresholds for hazardous drinking are defined as 4 or more for males and 3 or more for females [3]. An additional threshold result is presented, accounting for the removal of individuals who met the threshold based solely on item 1. For example, an individual who drinks one glass of wine four nights a week would meet the overall threshold, but would not meet the secondary threshold. While this individual may have a hazardous drinking habit, it cannot be determined by this screen alone.

In some instances, categories from the items from the questionnaire in the Appendix were combined to increase sample size. These response categories are indicated with an asterisk (*) in the Appendix. Other instances required recoding the variable, and these are noted in *italics*.

In each item sequence the first item addresses usage, a second question asks if there is a change in usage, a third item asks the direction of change (increase/decrease), and a fourth item asks for a reason or attribution for the change in usage. The number of responses for the fourth item in the sequence, or attribution item, is therefore smaller than the number of responses to the first item. For this reason, percentages for increased poor health habits, healthcare utilization, and medication usage were computed using the group n as the denominator instead of the n responding to that item.

3.4.1 Quantitative Analyses. Group frequencies and percentages for the aircrew and special duty rescue personnel were calculated for items assessing the following:

1. Demographics (gender, age range, marital status, and children dependents at home)
2. Occupational variables (rank range, time on station, and hours worked per week)
3. Health behaviors relating to sleep (average number of hours of sleep before work, change in sleep habits) and exercise (average number of days engaged in moderate physical exercise/strength training per week and schedule allows for fitness requirements)

4. Poor health habits (alcohol use-frequency, number of drinks per occasion, and Audit C results; tobacco use; and stimulant or caffeine use and portions per day) and increases in poor health habits
5. Medical conditions perceived to be created or worsened by unit assignment or occupational stress
6. Increased healthcare utilization (medical, mental, and alternative health services)
7. Increased medication utilization (prescription and OTC)

Independent proportions were calculated for variables with more than two response categories. These comparisons were not calculated for variables with two categories because results replicate logistic regression results included in the table. Independent proportion sample size assumptions were violated in instances where n was less than 5 (see annotation *a* in tables).

Logistic regressions were performed, predicting for special duty rescue group membership. Logistic regressions were not run in instances where sample size assumptions were not met for the outcome variable. The groups were required to have $n \geq 30$, and the individual categories for each predictor required $n \geq 5$ to be included in the logistic regression analysis. A statistical significance level of $p < 0.05$ was established a priori. In instances of significant chi-squares where the predicted category has a lesser odds than the comparison category, the inverse of the odds ratio (OR) and 95% confidence interval (CI) is noted in the table notes.

The comparison category is indicated for each categorical predictor by "a" in each of the tables. Comparison categories were chosen based upon a series of factors. For health behaviors, comparison categories were chosen based on healthy levels recommended by literature (e.g., 8 hours of sleep per night, 3-4 days of moderate exercise per week). For all other variables included in the logistic regression analyses, the comparison category was chosen based upon the baseline category response (e.g., no increase in alcohol use, no tobacco use, etc.).

3.4.2 Qualitative Analyses. A behavioral science researcher performed qualitative analyses on textual responses to the open-ended, write-in response items from the questionnaire in the Appendix. The semantics of participants' textual responses were analyzed and coded into a list of categories. The frequency of coded responses for each semantic category was computed and the top two to three responses are reported.

4.0 RESULTS

4.1 Demographics

The final dataset of CSAR respondents included 123 aircrew and 298 special duty rescue personnel. Frequencies for demographics and occupational variables for the aircrew and rescue groups are shown in Table 1. Results for logistic regressions predicting rescue group membership compared to aircrew and independent proportion comparisons (when necessary) are shown in Table 1. A larger proportion of rescue participants were age 18-25, enlisted, had 25 months or more in their current duties, and worked 51 hours or more.

Table 1. CSAR Demographics, Proportion Comparisons, and Logistic Regressions

Demographics and Occupational Variables	Aircrew		Rescue		*Independent Proportion p-value*	Logistic Regression Predicting Rescue Group		
	n	%	n	%		OR [95% CI]	Omnibus $\chi^2(df)$	*p-value*
Gender								
Male	117	95.90	298	100.00				
Female	5	4.10	0	0				
Age Range, yr								
18-25[a]	6	4.88	45	15.10	0.00		22.58(4)	0.00
26-30	39	31.71	102	34.23	0.62	0.35*[b] [0.14, 0.88]		
31-35	56	45.53	77	25.84	0.00	0.18*[c] [0.07, 0.46]		
36-40	16	13.01	43	14.43	0.70	0.36*[d] [0.13, 1.00]		
41+	6	4.88	31	10.40	0.07	0.69 [0.20, 2.34]		
Marital Status								
Single[a]	31	25.20	71	23.91			0.08(1)	0.78
Married	92	74.80	226	76.09		1.07 [0.66, 1.75]		
Dependents at Home								
Yes[a]	72	58.54	158	53.20			1.00(1)	0.32
No	51	41.46	139	46.80		1.24 [0.81, 1.90]		
Rank Range								
Enlisted	48	39.02	240	80.54		6.47* [4.07, 10.26]		
Officer[a]	75	60.98	58	19.46			66.91(1)	0.00
Time on Station, mo								
≤ 24[a]	81	65.85	147	49.33			9.72(1)	0.00
> 24	42	34.15	151	50.67		1.98* [1.28, 3.06]		
Hours Worked per Week								
30-50[a]	70	56.91	139	46.80			3.56(1)	0.06
51+	53	43.09	158	53.20		1.50* [0.98, 2.29]		

*Significant chi-square ($p < 0.05$) and OR.
[a]Comparison category for predictor.
[b]Inverse OR 2.87 [1.13, 7.26].
[c]Inverse OR 5.45 [2.18, 13.67].
[d]Inverse OR 2.79 [1.00, 7.79].

4.2 Sleep and Physical Exercise Health Behaviors

Group frequencies, results for logistic regressions predicting rescue group membership compared to aircrew, and independent proportion comparisons (when necessary) for sleep and physical exercise health behaviors are shown in Table 2. A larger proportion of rescue participants reported aerobic exercise 5-6 times a week, strength training 3-4 or 5-6 times a week, and that their schedule allows for their fitness requirements.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited reasons for sleeping less included *long hours*, *work stress*, and *family responsibilities.*

Table 2. CSAR Sleep and Exercise, Proportion Comparisons, and Logistic Regressions

Health Behaviors	Aircrew		Rescue		*Independent Proportion p-value*	Logistic Regression Predicting Rescue Group		
	n	%	n	%		OR [95% CI]	Omnibus $\chi^2(df)$	*p-value*
Hours of Sleep before Work								
≤4	1	0.81	3	1.01	*a*			
5	7	5.69	30	10.07	0.15	1.22 [0.44, 3.38]		
6	41	33.33	90	30.20	0.53	0.63 [0.31, 1.26]		
7	59	47.97	126	42.28	0.29	0.61 [0.31, 1.19]		
8[a]	14	11.38	49	16.44	0.19		4.54(3)	0.21
≥9	1	0.81	0	0.00	*a*			
Change in Sleep Habits								
Yes, sleep more	5	4.07	10	3.36	0.72	0.73 [0.24, 2.20]		
Yes, sleep less	52	42.28	106	35.57	0.20	0.74 [0.48, 1.14]		
No, no change[a]	66	53.66	182	61.07	0.16		1.97(2)	0.37
Aerobic Exercise per Week								
None	3	2.44	2	0.67	*a*			
1-2 times	40	32.52	43	14.43	0.00	0.59*[b] [0.35, 1.00]		
3-4 times[a]	63	51.22	115	38.59	0.02		30.59(2)	0.00
5-6 times	15	12.20	96	32.21	0.00	3.51* [1.88, 6.55]		
Daily	2	1.63	42	14.09	*a*			
Strength Training per Week								
None	13	10.57	0	0.00	*a*			
1-2 times	60	48.78	34	11.45	0.00	0.17*[c] [0.10, 0.30]		
3-4 times[a]	36	29.27	121	40.74	0.03		77.67(2)	0.00
5-6 times	13	10.57	113	38.05	0.00	2.59* [1.31, 5.13]		
Daily	1	0.81	29	9.76	*a*			
Schedule Allows for Fitness Requirements								
Yes[a]	71	57.72	233	78.19	0.00		21.73(2)	0.00
No	45	36.59	46	15.44	0.00	0.31*[d] [0.19, 0.51]		
I'm not sure	7	5.69	19	6.38	0.79	0.83 [0.33, 2.05]		

Note: *a* indicates sample size assumption (n ≥ 5) was not met for proportions analysis.
*Significant chi-square ($p < 0.05$) and OR.
[a]Comparison category for predictor.
[b]Inverse OR 1.70 [1.00, 2.88].
[c]Inverse OR 5.93 [3.38, 10.40].
[d]Inverse OR 3.21 [1.97, 5.24].

4.3 Poor Health Habits (Alcohol, Tobacco, Caffeine Use)

4.3.1 Alcohol Use. Group frequencies, results for logistic regressions predicting rescue group membership compared to aircrew, and independent proportion comparisons (when necessary) for alcohol use are shown in Table 3. Audit-C threshold results for males are also shown in Table 3. No significant differences were found.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited reasons for an increase in alcohol use included *occupational and personal stress* for both groups.

Table 3. CSAR Alcohol Use, Proportion Comparisons, and Logistic Regressions

Alcohol Use	Aircrew		Rescue		*Independent Proportion p-value*	Logistic Regression Predicting Rescue Group		
	n	%	n	%		OR [95% CI]	Omnibus $\chi^2(df)$	*p-value*
Alcohol Frequency								
Never[a]	10	8.13	39	13.09	0.15		5.81(4)	0.21
Monthly or less	35	28.46	83	27.85	0.90	0.61 [0.27, 1.35]		
2-4x a month	53	43.09	103	34.56	0.10	0.50 [0.23, 1.08]		
2-3x a week	18	14.63	61	20.47	0.16	0.87 [0.36, 2.08]		
4+ x a week	7	5.69	12	4.03	0.45	0.44 [0.14, 1.41]		
Drinks per Day								
0[a]	25	22.12	58	22.39	0.95		3.74(2)	0.16
1-2	74	65.49	165	63.71	0.74	0.54 [0.26, 1.14]		
3-4	11	9.73	34	13.13	0.36	0.75 [0.33, 1.72]		
5+	3	2.65	2	0.77	*a*			
6+ Drinks per Occasion								
Never[a]	63	55.75	141	54.44	0.82		0.02(1)	0.89
Less than Monthly	42	37.17	91	35.14	0.71	0.96 [0.60, 1.55]		
Monthly	4	3.54	20	7.72	*a*			
Weekly/Daily	4	3.54	7	2.70	*a*			
Audit C Threshold Males								
Above	25	23.15	73	28.19		1.30 [0.77, 2.20]		
Below[a]	83	76.85	186	71.81			1.01(1)	0.32
Audit C Secondary Threshold Males								
Above	24	22.22	72	27.80		0.81 [0.55, 1.19]		
Below[a]	84	77.78	187	72.20			1.23(1)	0.27
Alcohol Increase								
Yes	11	8.94	23	7.72		0.85 [0.40, 1.81]		
No[a]	112	91.06	275	92.28			0.17(1)	0.68

Note: *a* indicates sample size assumption ($n \geq 5$) was not met for proportions analysis.
[a]Comparison category for predictor.

4.3.2 Tobacco Use. Group frequencies and results for logistic regressions predicting rescue group membership compared to aircrew are shown in Table 4. No significant differences were found. The most frequent responses to the open ended question to types of tobacco used were *cigarettes* (8.94% aircrew, 0% rescue) and *smokeless tobacco* (13.01% aircrew, 15.10% rescue). Responses to "On average, how much tobacco have you used over the past month?" were not included in the analyses because of the low number. The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited reasons for an increase in tobacco use included *stress* and *peers*.

Table 4. CSAR Tobacco Use, Proportion Comparisons, and Logistic Regressions

Tobacco Use	Aircrew		Rescue		Logistic Regression Predicting Rescue Group		
	n	%	n	%	OR [95% CI]	Omnibus $\chi^2(df)$	*p-value*
Any Current Use							
Yes	29	23.58	56	18.79	0.75 [0.45, 1.25]		
No[a]	94	76.42	242	81.21		1.21(1)	0.27
Tobacco Increase							
Yes	16	13.01	31	10.40	0.78 [0.41, 1.48]		
No[a]	107	86.99	267	89.60		0.58(1)	0.45

[a]Comparison category for predictor.

4.3.3 Caffeine/Energy Supplement Consumption. Group frequencies, results for logistic regressions predicting rescue group membership compared to aircrew, and independent proportion comparisons (when necessary) for caffeine use are shown in Table 5. No significant differences were found. The results revealed the most frequently cited types of caffeine included *coffee, designer energy drinks, soda,* and *tea*.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited reasons for an increase in caffeine use included *long work hours and high workload, staying alert for family or personal commitments,* and *general exhaustion.*

Table 5. CSAR Caffeine Use, Proportion Comparisons, and Logistic Regressions

Caffeine Use	Aircrew		Rescue		*Independent Proportion p-value*	Logistic Regression Predicting Rescue Group		
	n	%	n	%		OR [95% CI]	Omnibus $\chi^2(df)$	*p-value*
Caffeine Use in Past Month								
Yes	109	88.62	242	81.21		0.56 [0.30, 1.04]		
No[a]	14	11.38	56	18.79			3.66(1)	0.06
Caffeine Portions per Day								
0[a]	32	26.02	98	32.89	0.17		4.41(3)	0.22
1-2	41	33.33	109	36.58	0.53	0.87 [0.51, 1.49]		
3-4	35	28.46	67	22.48	0.19	0.63 [0.35, 1.11]		
5+	15	12.20	24	8.05	0.18	0.52 [0.25, 1.12]		
Traditional Caffeine Portions per Day								
0[a]	42	34.15	113	37.92	0.47		8.09(3)	0.04
1-2	37	30.08	118	39.60	0.07	1.19 [0.71, 1.98]		
3-4	33	26.83	51	17.11	0.02	0.57*[b] [0.33, 1.01]		
5+	11	8.94	16	5.37	0.17	0.54 [0.23, 1.26]		
Designer Energy Caffeine Portions per Day								
0[a]	90	73.17	235	78.86	0.21		1.57(1)	0.21
1-2	32	26.02	59	19.80	0.16	0.73 [0.45, 1.19]		
3-4	1	0.81	3	1.01	*a*			
5+	0	0.00	1	0.33	*a*			
Consume Traditional and Designer Energy Drinks								
Yes	23	18.70	48	16.11		0.84 [0.48, 1.45]		
No[a]	100	81.30	250	83.89			0.41(1)	0.52
Caffeine or Energy Supplement Use								
Yes	4	3.74	18	7.53				
No[a]	103	96.26	221	92.47				
Frequency of Caffeine/ Energy Supplement Use								
Occasionally[a]	1	20.00	3	14.29				
Frequently	3	60.00	5	23.81				
Daily	1	20.00	10	47.62				
>1x a day	0	0.00	3	14.29				
Caffeine Increase								
Yes	39	31.71	79	26.51		0.78 [0.49, 1.23]		
No[a]	84	68.29	219	73.49			1.15(1)	0.28

Note: *a* indicates sample size assumption ($n \geq 5$) was not met for proportions analysis.
*Significant chi-square ($p < 0.05$) and OR.
[a]Comparison category for predictor.
[b]Inverse OR 1.74 [0.99, 3.06].

4.4 Medical Conditions Created by or Made Worse by Assignment

Participants were asked to check off from a list any medical conditions or symptoms believed to be caused or made worse by occupational stress. In addition, an *other* category was provided for open-ended text responses. Open responses were incorporated into existing categories, when applicable. Some of the survey categories were then combined into larger categories for analysis (see the Appendix for further clarification). Table 6 shows comparisons of group proportions for each combined category. A larger proportion of aircrew reported *musculoskeletal injury and pain* when compared to the rescue group.

The results of qualitative analyses of participants' responses to the open-ended, write-in response item "What actions are needed to improve your medical care?" revealed that the most common responses were *offering an onsite PT or chiropractor, better accessibility or quality of medical services,* and *increased exercise and trainers* for both groups.

Table 6. Most Frequency Cited Conditions Perceived to be Created or Made Worse by Occupational Stress and Proportion Comparisons

Medical Condition	Aircrew[a]		Rescue[b]		*p-value*
	n	%	n	%	
Musculoskeletal injury/pain (e.g., back, neck, joint pain)	73	59.35	145	48.66	0.05
Headaches, eye strain/vision problems	37	30.08	65	21.81	0.07
Sleep oroblems (e.g., insufficient sleep)	36	29.27	67	22.48	0.14

[a]Denominator n = 123.
[b]Denominator n = 298.

4.5 Changes in Healthcare Utilization Since Current Unit Assignment

4.5.1 Medical Services. Group frequencies and results for logistic regressions predicting rescue group membership compared to aircrew for increased medical services and endorsed unreported injury or illness are shown in Table 7. No significant differences were found.

The results of qualitative analyses of participants' responses to the open-ended, write-in response item revealed the most frequently cited reasons for an increase in medical care utilization included *medical conditions, injuries or pain, aging,* and *increased access and availability to facilities (rescue group only).*

The results of qualitative analyses of participants' responses to the open-ended, write-in response item "Why did you choose not to report it?" when participants selected YES to currently experiencing any physical injury or illness that may negatively affect performance but have not yet reported to a physician or medical services revealed that the most common responses were *DNIF* [duties not including flying] *concerns, no available time in schedule,* or *the ailment isn't severe enough to warrant medical services.*

4.5.2 Mental Health Services. Group frequencies and results for logistic regressions predicting rescue group membership compared to aircrew for increased use of mental health services and if perceived stigma prevents the individual from seeking care are shown in Table 7. No significant differences were found.

The results of qualitative analyses of participants' responses to the open-ended, write-in response item revealed the most frequently cited reasons for an increase in mental healthcare utilization included *occupational stress* and *availability and understanding (rescue group only).*

4.5.3 Alternative Health Services. Group frequencies and results for logistic regressions predicting rescue group membership compared to aircrew for increased use of alternative health services are shown in Table 7. A larger proportion of rescue participants reported an increase in alternative health services utilization.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited reasons for increasing alternative healthcare utilization included two categories: *musculoskeletal injury/pain* (e.g., seeking chiropractic care, acupuncture, massage therapy for back, neck pain) and *occupational stress* (e.g., seeking massage therapy to reduce muscle tension from work).

Table 7. CSAR Healthcare Utilization, Proportion Comparisons, and Logistic Regressions

Healthcare Utilization	Aircrew		Rescue		Logistic Regression Predicting Rescue Group		
	n	%	n	%	OR [95% CI]	Omnibus $\chi^2(df)$	*p-value*
Medical Care Increase							
Yes	27	21.95	81	27.18	1.33 [0.81, 2.18]		
No[a]	96	78.05	217	72.82		1.27(1)	0.26
Unreported Injury or Illness							
Yes	23	18.70	57	19.19	1.03 [0.61, 1.77]		
No[a]	100	81.30	240	80.81		0.01(1)	0.91
Mental Health Increase							
Yes	14	11.38	20	6.71	0.56 [0.27, 1.15]		
No[a]	109	88.62	278	93.29		2.41(1)	0.12
Stigma Prevent Seeking Care							
Yes	27	22.88	47	15.93	0.64 [0.38, 1.09]		
No[a]	91	77.12	248	84.07		2.67(1)	0.10
Alternative Health Provider Increase							
Yes	27	21.95	112	37.58	2.14* [1.32, 3.49]		
No[a]	96	78.05	186	62.42		10.06(1)	0.00

*Significant chi-square ($p < 0.05$) and OR.
[a]Comparison category for predictor.

4.6 Changes in Prescription and OTC Medication Use

4.6.1 Prescription Medication Use. Group frequencies and results for logistic regressions predicting rescue group membership compared to aircrew for increased prescription medication use are shown in Table 8. No significant differences were found.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited reasons for an increase in prescription medication usage included *pain management* and *occupational stress.*

4.6.2 OTC Medication Use. Group frequencies and results for a logistic regression predicting rescue group membership compared to aircrew for increased OTC medication use are shown in Table 8. No significant differences were found.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response revealed most frequently cited reasons for an increase in OTC medication usage included *pain management* and *age (for aircrew only).*

Table 8. CSAR Medication Use, Proportion Comparisons, and Logistic Regressions

Medication Use	Aircrew		Rescue		Logistic Regression Predicting Rescue Group		
	n	%	n	%	OR [95% CI]	Omnibus $\chi^2(df)$	*p-value*
Prescription Increase							
Yes	9	7.32	14	4.70	0.62 [0.26, 1.48]		
No[a]	114	92.68	284	95.30		1.10(1)	0.30
OTC Increase							
Yes	13	10.57	16	5.37	0.48 [0.22, 1.03]		
No[a]	110	89.43	282	94.63		3.41(1)	0.07

[a]Comparison category for predictor.

5.0 DISCUSSION

The current study represents an anonymous and voluntary survey assessment of health behaviors within the USAF CSAR aircrew and special duty rescue population. Although an exhaustive review of all results is beyond the scope of this report, the more salient findings from each category of health behaviors, poor health habits, general medical conditions, healthcare utilization, and medication use among CSAR personnel are discussed below. Each of the health behaviors assessed will be discussed with the aircrew and rescue groups in comparison, as well as in comparison to available data within the American population. Recommendations to leadership and medical personnel are also provided throughout the discussion section.

5.1 Demographics

The aircrew sample overall was largely male (95.90%), young (82.12% were 35 years old or younger), married (74.80%), officers (60.98%), with 24 or less months on station (65.85%) and dependents at home (58.54%). USAF policy at the time of the study stipulated enlisted rescue Air Force Specialty Codes were male only, and therefore the rescue sample was entirely male and mainly enlisted (80.54%). The majority of rescue personal were similar to aircrew in that they were also young (75.17% were 35 years old or younger) and married (76.09%). However, rescue personnel had higher rates of individuals working 51 or more hours per week than aircrew (53.20% vs. 43.09%) and were more likely to be in their current station for longer periods of time (24 months or more; 50.67% vs. 34.15%).

5.2 Health Behaviors

5.2.1 Sleep. A significant proportion of CSAR personnel fall below the 7 to 9 hours of sleep to function at peak levels, as recommended by the National Sleep Foundation and the American Academy of Sleep Medicine [4,5]. A total of 39.83% of CSAR aircrew and 41.28% of rescue personnel reported getting 6 hours of sleep or less before work, placing them at elevated risk for accidents or chronic health problems. Although recent population data have yielded slightly differing results, it is estimated that between 59-65% of American adults report receiving this amount of sleep [6,7]. According to the most recent Gallup statistics, the estimation decreases slightly to 54-56% when considering only Americans between the ages of 18-49 [6]. Equally alarming is the significant percentage of respondents (42.28% of aircrew and 35.57% of rescue personnel) who endorsed sleeping less since beginning CSAR duties.

A recent study by Cohen and colleagues examined the effects of both chronic and acute sleep deprivation on performance across the full circadian cycle [8]. This study demonstrated that chronically sleep-restricted individuals (i.e., those who sleep for short durations on work nights and long durations on weekends and holidays) may develop a false sense of recovery from their sleep restriction due to the fact that after a long bout of sleep, their performance recovers for the first few hours of the day but then declines over the course of the day [8]. Additionally, chronic sleep restriction results in the most severe performance decrements during an individual's late "circadian night" (typically corresponding to 3 a.m. to 7 a.m.), even subsequent to a long sleep duration on a day off, and that this chronic sleep loss may "reduce an individual's ability to cope with circadian misalignment from rotating shift schedules" [8]. Although individual differences exist in the amount of sleep necessary for optimal functioning [9], and the definition of sleep deprivation is often deemed dependent on an established impairment in functioning [10], this study did not assess for functional impairment due to insufficient sleep, making it difficult to make an unequivocal statement about CSAR personnel in this sample being objectively "sleep deprived."

Nonetheless, the results of the study suggest integrated operational support should include outreach efforts aimed at improving sleep habits and helping CSAR personnel develop solutions to issues that interfere with obtaining adequate sleep. Obtaining sufficient sleep is essential to ensuring recovery from participation in physically and psychologically rigorous duties. Participants also reported sleep difficulties as a primary health-related condition made worse by their occupational assignment. The most frequently cited reasons for a decrease in sleep were occupational and personal/family responsibilities, thus providing insight into possible points of intervention/prevention for medical and line leadership. With 29.27% of aircrew and 22.48% of rescue reporting sleep concerns, it is critical to address these concerns for improving performance and mitigating work-related mishaps.

5.2.2 Physical Exercise. With respect to exercise behavior, a significant proportion of respondents fall below the exercise frequency and intensity recommended by the Centers for Disease Control and Prevention and the U.S. Department of Health and Human Services [11]. The current guidelines for adults recommends at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity aerobic physical activity, or a combination of the two, weekly for maximum health benefits; the guidelines also recommend strength training at moderate to high intensity two or more days per week. Although respondents were not asked specifically how many minutes they worked out, even the most liberal estimate (the top two categories: 20 minutes or more five times per week or more) would place only 13.83% of CSAR aircrew and 46.30% of rescue personnel within these guidelines. Alternatively, almost all CSAR personnel (89.43% of aircrew and 100% of rescue personnel) report strength training at least one to two times per week, as recommended. This may speak to this cohort's preferred method of exercise, although such regimens only meet half of the recommendation for weekly physical activity. Finally, rescue personnel were significantly more likely to report recommended frequency of aerobic exercise (five to six times per week) and strength training (three to six times per week) than aircrew, as well as to affirm that their schedule allows for their fitness requirements. One hypothesis is that with rescue personnel largely self-reporting as enlisted (80.54%), perhaps they have fewer occupational and/or personal responsibilities occupying their time, as compared to their officer cohorts. Alternatively, the physical requirements and demands may be more

rigorous for rescue personnel and, therefore, more time is allotted for exercise and sustainment of physical fitness.

5.2.3 Alcohol Use. The 2014 National Survey on Drug Use and Health (NSDUH) reported 79.3% of full-time employed adults 18 years of age or older report consuming alcohol in the past year, and 65.5% report consuming alcohol in the past month [12]. Results of this survey suggest a much higher percentage of CSAR personnel consume some quantity of alcohol when including any endorsement of alcohol consumption (91.87% of aircrew and 86.91% of rescue personnel). However, division of our sample between "monthly or less" and response options with more frequency (two to four times a month, two to three times a week, four or more times a week) is relevant because the NSDUH defines a current alcohol user as someone who has consumed alcohol in the previous 30 days [12]. Based upon this definition and upon the latest NSDUH results, 56.9% of American adults are current alcohol users. This is very similar to the proportion of aircrew and rescue personnel who indicated an alcohol consumption frequency greater than monthly (63.41% for aircrew and 59.06% for rescue), suggesting the proportion of CSAR personnel consuming alcohol is likely closer to the proportion of adults in the general population currently consuming alcohol than the comparison with the NSDUH initially suggests.

The current survey included a standardized alcohol screening tool (Audit-C), which sets a threshold for alcohol misuse, including a range of issues from drinking over recommended limits (acutely or chronically) to meeting criteria for alcohol dependence. The most recent, published, population-based data for the Audit-C are from a year-long, cross-sectional study of over 1300 adults presenting to a civilian family medicine clinic, which reported 26.6% of males exceeded the threshold for alcohol misuse [13]. Approximately one in four males exceed the Audit-C screening threshold in the current study (23.15% aircrew and 28.19% rescue), indicating some form of alcohol misuse. These percentages are similar to the percentage reported in the normative sample. When a secondary screening was taken into account, to exclude individuals exceeding the threshold based on the first item in the screening alone, or someone who may drink one alcoholic beverage four nights a week, the percentages meeting threshold only reduced minimally (22.22% for aircrew and 27.80% for rescue).

The Audit-C also includes a specific question assessing binge drinking behavior, the most common form of alcohol misuse. The 2014 NSDUH suggests that 30.4% of full-time employed adults age 18 or older reported binge drinking in the past month, defined as drinking five or more drinks on one occasion [12]. The current survey and the NSDUH data are not direct comparisons for two reasons: the current survey defines binge drinking as six or more drinks on one occasion, and the frequency of binge drinking in the past month was not accessed; rather, the survey item accessed how frequently, in general, binge drinking occurred. These differences likely account for the higher percentages found in the current survey for endorsement of binge drinking, with 44.25% of aircrew and 45.56% of rescue reporting any endorsement of binge drinking.

Coupled with the percentages from the current study reporting an increase in alcohol use (8.94% for aircrew and 7.72% for rescue), an understanding of the attributing factors for alcohol misuse for this population is important. A possible explanation is that these data reflect a change in drinking motives and not a change in actual drinking quantities. There is a substantial body of literature on the "why" of drinking in addition to research on the "how much" and "how often." Many studies have found that motives for drinking consistently fall into three distinct categories: coping motives (i.e., to reduce or avoid negative emotional states such as anxiety), social motives (i.e., to gain acceptance or approval from peers), and enhancement motives (i.e., to increase or

maintain positive emotional states such as feelings of excitement) [14,15]. Coping motives in particular have been found to be associated with more problematic drinking behavior and drinking-related consequences [16]. Although no studies have been conducted to date on the effect of a shift in motives on perceived alcohol consumption, a stress-induced shift from social or enhancement motives to coping motives could theoretically result in a perceived increase in consumption. When given an opportunity to identify the reasons for increasing their alcohol use, both aircrew and rescue personnel indicated occupational and personal stress, suggesting that these increases are almost exclusively associated with coping motives for drinking.

Given that participants reported occupational and personal stress as their primary reasons for increase in alcohol usage, it is recommended integrated operational support services include educational interventions that distinguish problematic and maladaptive alcohol use from healthy, normal use. Interventions may also include alternative coping mechanisms for addressing the underlying issues and causes of increased and problematic alcohol usage.

5.2.4 Tobacco Use. Substance Abuse and Mental Health Services Administration data from 2014 indicate that 28.6% of the full-time working American adult population consumes tobacco/nicotine in some form [12]. This percentage is higher than the 23.58% of aircrew and 18.79% of rescue endorsing current tobacco use. However, rates of tobacco use reported by participants in this survey are lower than national averages with respect to cigarette use (8.94% of aircrew compared to approximately 19%, respectively [17]). However, respondents reported smokeless tobacco use that is higher than the average in the American adult male population (13.01% aircrew and 15.10% rescue personnel, as compared to 7% of American males [12]). Given increased restriction in available locations to smoke cigarettes, it may be the case that it is more convenient and inconspicuous to utilize smokeless tobacco than cigarettes for this cohort, both at home and in the workplace. It is likely that the creation of almost comprehensive bans on tobacco use, especially smoking, on many Air Force installations has encouraged a percentage of personnel to switch to smokeless tobacco as an alternative. Smokeless tobacco, although not as lethal as cigarettes, is associated with its own set of health problems and risks, including oral cancers and increased risk for cardiovascular disease [18,19]. Understanding and monitoring patterns and motivations for smokeless tobacco use will be important to prevent health issues associated with this behavior.

Of additional concern is that 13.01% of aircrew and 10.40% of rescue personnel report an increase in tobacco use since joining a CSAR unit, attributable to both stress and socialization. CSAR personnel may engage in tobacco use to connect with other CSAR personnel and, in turn, tobacco use may provide the secondary benefit of serving as a perceived stress reliever, in lieu of other healthier options (such as exercise). The results of the study suggest that the use of smokeless tobacco is a more socially approved and preferred form of nicotine intake.

In sum, respondents to this survey are using smokeless tobacco at notably higher rates than the general population, increasing their susceptibility to a number of cancers, as well as heart disease and stroke [18]. Integrated operational support services directed toward CSAR personnel targeting the use of smokeless tobacco and alternative habits for managing stress may be helpful at decreasing utilization rates. This may also require operational leadership to address the social and cultural norms within their community that endorse or reinforce the use of tobacco products.

5.2.5 Caffeine Use. The majority of aircrew (88.62%) and rescue (81.21%) personnel reported caffeine consumption in the past month. These percentages are slightly less than the most recent estimates from the general adult population, which indicate 89% of American adults consume caffeine [20]. The results of the study also reveal that 17-27% of rescue and aircrew (respectively) personnel consume three or more traditional (e.g., coffee, soda, tea) caffeinated beverages and 20-26% consume at least one or more designer energy beverages (e.g., Monster, RockStar, Red Bull) daily. Furthermore, approximately 16-18% consume both traditional and designer energy beverages daily.

Although these aircrew and rescue personnel do not appear to be significantly different from each other in terms of their caffeine consumption patterns, there were some important differences between them and the general adult population. In 2015, an estimated 4.3% of the American population consumed energy drinks [21]. In the current survey, 26.83% of aircrew and 21.14% of rescue personnel endorsed consuming one or more designer energy drinks per day. Recent research on young populations (i.e., college students) and military samples suggests designer energy drink use is on the rise in these populations. Between 42-51% of college-aged students are estimated to consume energy drinks in a given month [22], and in a study of active duty Navy and Marine Corp personnel, 28% of those surveyed consumed energy drinks on a regular basis [23]. Fulgoni and colleagues examined trends in caffeine intake patterns assessed by the National Health and Nutrition Examination Survey (NHANES) between 2001-2010 and noted that estimates of overall caffeine consumption for American adults have been remarkably stable, not only for the 10-year NHANES data but for another decade prior to that as well [20]. The authors suggest that this long-term stability in caffeine consumption suggests adults attempt to maintain a caffeine set-point, potentially to maximize the psychological and physiological effects of caffeine. Additionally, a greater proportion of personnel consume traditional sources of caffeine (i.e., coffee, tea, and soda; 65.85% aircrew and 62.08% rescue) than both traditional and designer energy drinks (18.70% aircrew and 16.11% rescue) or endorse use of caffeine or energy supplements (3.74% aircrew and 7.53% rescue), indicating the largest portion of their caffeine consumption overall is still from these traditional sources. However, by adding these alternative sources of caffeine to their traditional sources, personnel may be unknowingly exceeding recommended daily levels of caffeine consumption.

Long work hours, high workload, staying alert for family or personal commitments, and general exhaustion were listed as attributions for the 31.71% of aircrew and 26.51% of rescue reporting an increase in caffeine consumption. While the current data do not allow for definitive conclusions about these findings, motives for consumption could explain these differences. For example, a shift from habitual consumption of caffeine to enhancement consumption of caffeine (i.e., consuming for the performance-enhancing effects of caffeine) could lead personnel to believe they are consuming more when in fact they are only consuming for different reasons. Future surveys will need to gather more information regarding milligrams of caffeine consumed as well as motivations for consumption to better understand overall caffeine consumption patterns in CSAR personnel.

The use of such beverages is common among airmen and a behavioral health habit that will likely require additional surveillance to fully understand the impact on functioning. Commonly cited reasons appear to be centered on overcoming fatigue in both occupational and domestic settings. The results of this study suggest that integrated operational support services may include monitoring and outreach efforts related to usage of such beverages. Education on the potential misuse and health-related consequences of excessive use may be warranted given

the various ingredients used in designer energy beverages that may have synergistic, multiplicative side effects and health-related consequences (e.g., problematic sleep) when combined with intake of traditional caffeinated beverages.

5.3 Medical Conditions

Overall, a significant proportion of participants in this survey report negative changes to their health status since joining a CSAR unit. More than half (59.35%) of aircrew respondents and approximately half (48.66%) of rescue personnel report physical pain has worsened since joining CSAR, with at least one out of every five respondents also reporting an increase in headaches, eye strain, or sleep problems since joining their unit. The prevalence of such health conditions is higher among CSAR than the general population [24]. Insufficient sleep was also listed as a concern and is discussed in the sleep section of this paper.

When asked what would improve medical care, responses were consistent with the theme of increasing accessibility and availability of the appropriate medical services. It may be that the rigorous CSAR lifestyle and variable work hours may prevent members from having timely and convenient access to providers, which may exacerbate medical problems that might otherwise be better managed. The most frequently cited recommendations from participants for improving integrated operational support were centered on having accessible, specialty-trained providers (with particular emphasis on physical therapy and sports exercise) and improved quality of care tailored to improving performance and adaption to occupational demands. The results revealed that respondents were not just interested in mitigation of illness or injury, but healthcare efforts that targeted the promotion of optimal state of well-being and performance. The results of the study also suggest outreach efforts encouraging alternative care strategies for managing pain and sleep-related difficulties as well as routine eye exams (30.08% of aircrew and 21.81% of rescue reported headaches or eye strain/vision problems as medical conditions created by or made worse by current assignment) should also be considered.

5.4 Healthcare Utilization (Medical Services, Mental Health Services, Alternative Health Services)

While the percentages of aircrew personnel endorsing an increase in traditional and alternative healthcare services since being assigned to CSAR duties were identical (21.95%) and similar to traditional services for aircrew (27.18%), more rescue personnel reported an increase in utilizing alternative health provider services than traditional medical care (37.58%). This percentage was also significantly different from the aircrew endorsement of alternative health provider increase. This may be attributed to rescue personnel having greater access to alternative care, or the ailments commonly reported by rescue personnel, such as pain management, being better handled by alternative care, such as massage therapy or chiropractor services. This is supported by the survey item asking respondents what actions were needed to improve their medical care, with the most common responses including offering an onsite physical therapist or chiropractor and better accessibility or quality of medical services. In addition, the percentages for rescue personnel would be higher for increased medical services if they were given increased access and availability to facilities, a common observation for the write-in item inquiring about the change in medical care utilization.

Approximately one in four (18.70% for aircrew and 19.19% for rescue) CSAR personnel responded that they had an unreported injury or illness. Taking individual differences into account, and varying pain tolerances, this group of individuals is chosen and then trained with physical and emotional endurance in mind. Open responses such as “the ailment isn’t severe enough to warrant medical services” is an example of this, but also concerns of mission readiness, and being put on DNIF status, are common reasons for unreported injuries or illness. While 11.38% of aircrew and 6.71% of rescue personnel reported an increase in mental healthcare utilization, the percentages of individuals in need of mental healthcare are likely higher for both groups. This reasoning is supported by an item in the survey asking if stigmas from mental health issues prevent the survey participant from seeking care. The percentage from both groups endorsing yes to this item (22.88% for aircrew and 15.93% for rescue) should be of concern to the mental health professionals within the USAF because it points to a needed cultural shift. When compared with the most recent annual NSDUH, utilization rates for adult males have steadily increased from 8.7% in 2002 to 10.6% in 2014 [12].

Overall, the results reveal that both groups of respondents reported hesitancy as a reason for not reporting health-related conditions due to concerns regarding negative impact on career and being removed from aircrew/special duty operations, as well as the obstacle of finding time in schedules to depart from work and seek care. The stigma of seeking medical or mental healthcare and underreporting of conditions are not unusual phenomena among CSAR personnel. It is recommended that integrated operational support services focus on identifying and providing care to personnel with underreported conditions. Efforts aimed at early intervention and mitigation may help to improve readiness and performance capabilities by curbing the chronicity or increasing severity of an injury or illness. Outreach efforts may need to take into account the necessity of building rapport in an effort to promote recognition and reporting of impairing health-related conditions among CSAR personnel.

5.5 Medication Use

An increase in prescription medication usage was reported by 7.32% of aircrew and 4.70% of rescue. The percentage of aircrew and rescue reporting an increase in OTC medication utilization was higher than prescription medication for aircrew and similar to prescription medication for rescue, with 10.57% of aircrew and 5.37% of rescue reporting an increase in utilization since being assigned to their current duties. Although the identifying usage of various types and frequency for both prescription and OTC medication was not an objective of this study, responses to the survey provided insight into the common reasons for the general increases in the use of medication. Such reasons included pain management, occupational stress, and age-related conditions, respectively. The increases in medication usage correspond with the health conditions exacerbated by occupational demands (i.e., musculoskeletal injury, sleep-related difficulties, pain, stress).

CSAR personnel with underreported conditions may seek to manage health problems on their own via use of available medications, and potential problems and concerns with self-medication are well-documented [25]. The most common reasons for seeking medication also provide insight into target areas for integrated operational support. Alternative, nonpharmaceutical strategies for preventing and managing pain-, stress-, sleep-, and age-related issues may be particularly beneficial. Outreach efforts may include educating CSAR personnel

on the potential risks and consequences of common OTC medications and the interaction such medications can have on seemingly benign conditions and/or other medications.

6.0 STUDY LIMITATIONS

Although this study raises awareness of health behaviors and issues that may benefit from interventions, there are some limitations to consider. First, due to the absence of validity scales within the survey, it is difficult to assess the degree of impression management that participants may have engaged in while completing the survey. First, the intent of this study is not to diagnose, but only to screen for indicators of negative health outcomes. Second, this study is also not able to account for preexisting conditions (prior to being assigned to CSAR operations) that may have affected self-report and study outcomes. Third, not all items in the survey matched the questionnaire patterns of other studies in the civilian population that would allow for direct comparisons with national averages. The nonstandardized items provide only a general glimpse into specific areas of health. Subsequent administrations of the survey could benefit modifications to nonstandardized items that allow for more direct comparisons. Fourth, the nature of this study was not amenable for cause-effect conclusions to be drawn. Although analyses of textual responses provide reasons for increased alcohol, tobacco, medical/mental healthcare, and medication usage (prescription and OTC), additional studies are needed for making definitive conclusions. Fifth, the results of this study did not fully address the functional impairment of the health behaviors reported, such as substance use (i.e., alcohol, prescription drugs). Furthermore, participants reporting sleep issues, increased use of medical services, medical symptoms, and increases in substance use do not necessarily require treatment or intervention. The study can be improved upon via simultaneous assessment of functional impairment to support the validity of assumptions to performance that are made. Sixth, self-report surveys are prone to response bias from a self-selected sample that might affect generalization of results. Simply put, whenever assessing for the impact within an organization, it is always a possibility there will be sampling bias. This bias may occur as a result of those individuals who are at highest risk and wanting to expose their concerns. However, sampling bias is not necessarily a negative issue if it serves to reveal the intended, at-risk population. In spite of these limitations, the current findings support the notion that working in the operationally demanding CSAR environment may be associated with adverse health outcomes that would benefit from integrated operational support initiatives.

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APPENDIX

Questions Assessing Health-Related Behaviors and Utilization of Medical Services

Question	Response
Sleep	
On average, how many hours of sleep do you obtain each night or day, prior to starting work?	4 hours or less 5 hours 6 hours 7 hours 8 hours 9 hours or more
Since being assigned to your current unit, have you experienced a change in your sleeping habits?	Yes, I sleep more Yes, I sleep less No, I've experienced no change
If your sleep habits have changed, to what would you attribute the change?	*Open response*
Physical Exercise	
How often do you engage in moderate to vigorous, aerobic, physical activity each week (20-30 mins of jogging/running, fast cycling, etc.)?	0 days per week 1-2 days per week 3-4 days per week 5-6 days per week* Daily*
How often do you engage in moderate to vigorous strength training (weight lifting or cross-training for at least 20 minutes per exercise session)?	0 days per week 1-2 days per week 3-4 days per week 5-6 days per week* Daily*
Do you feel your operational/flying schedule provides enough time to effectively manage your fitness requirements?	Yes No I am not sure
Alcohol Use	
How often do you have a drink containing alcohol? *(Audit C - Item #1)*	Never Monthly or less 2-4 times a month (once a week or less) 2-3 times a week 4 or more times a week
How many standard drinks containing alcohol do you have on a typical day (standard alcohol serving sizes = 12 oz of beer, or 5 oz of wine, or 1.5 oz of liquor)? *(Audit C - Item #2)*	0; 1; 2; 3; 4; 5; 6; 7; 8; 9; 10+ *Recoded: 0; 1-2; 3-4, 5+*

How often do you have 6+ drinks on one occasion? *(Audit C - Item #3)*	Never Less than monthly Monthly Weekly* Daily or Almost Daily*
Since your assignment to this unit, has your use of alcohol changed?	Yes No Not Applicable (Do Not Drink)
If yes, how has it changed?	Do not drink alcohol anymore Alcohol use has decreased Alcohol use has increased *Recoded-Increase: Yes/No*
If your alcohol use changed, what do you attribute the change to?	*Open response*
Tobacco Use	
Do you use tobacco products?	Yes No
If yes, what types of tobacco products do you use? List all that apply (ex: cigarettes, smokeless tobacco, electric cigarettes, etc.).	*Open response*
On average, how much tobacco have you used over the past month? Annotate all that apply. If your tobacco product is not listed, please provide details in the "other" text box.	None < than ½ pack cigarettes / day < than ½ packet chew / day < than ½ can dip / day 1 pack of cigarettes / day 1 packet of chew tobacco / day 1 can of dip / day > than 1 pack of cigarettes / day > than 1 packet of chew / day > than 1 can of dip / day *Other (please specify)*
Since joining the Air Force, has your use of tobacco changed?	Yes No Not applicable (do not use tobacco)
If yes, how has it changed?	Do not use tobacco anymore Tobacco use has decreased Tobacco use has increased *Recoded-Increase: Yes/No*
If your tobacco use changed, what do you attribute the change to?	*Open response*
Caffeinated Beverage Use	
Do you consume caffeinated beverages, energy drinks or other types of energy supplements?	Yes No

What caffeinated or energy beverages do you typically drink? From the chart below, please select the number of portions and portion size of each beverage type that you consume on an average day. *(multiple check list)* *(Traditional Caffeine):* Tea; coffee (standard brew); designer coffee (espresso and espresso based drinks like Starbucks); decaf coffee/tea; standard soda (Coke, Pepsi, Diet Coke); high caffeine soda (Dr. Pepper, Mt Dew) *(Designer Caffeine):* Designer energy drink (Monster, Red Bull, Rock Star, etc.); shot-sized energy drink (5-Hour Energy, etc.)	1 portion; 2 portions; 3 portions; 4 portions; 5+ portions *Recoded: 0; 1-2; 3-4; 5+* 6 oz; 8 oz; 10 oz; 12 oz; 16 oz; 24 oz
Do you use other caffeine or energy supplements (i.e., NoDoze, Alert, Vivarin, Rip Fuel, etc.)?	Yes No
If yes, how frequently?	Occasionally (1-2 times a month) Frequently (1-2 times per week) Daily (once every day) More than once a day
Since your assignment to this unit, has your overall use of caffeinated/energy products changed?	Yes, it has increased Yes, it has decreased No, it has not changed Not applicable *Recoded-Increase: Yes/No*
If yes, to what do you attribute the change?	*Open response*
Medical Conditions	
Please list any medical conditions you have that you believe have been created by or made worse by occupational stress: (*multiple check list*)	Sleep issues; nausea; bowel issues; *Recoded-combined categories:* Headaches; eye strain / vision problems; *Recoded-combined categories:* neck pain; back pain; chest pain; *Recoded-combined categories:* heart palpitations; high blood pressure; heartburn; *Recoded-combined categories:* depression; anxiety; *other (open response)*
What actions are needed to improve your medical care? Please describe	*Open response*
Please list medical conditions for which you are taking medication (prescribed or over-the-counter).	*Open response*

Medical Services Utilization	
In general, since your current assignment, has your use of medical services changed?	Yes No
If yes, how has it changed?	Use of medical services has decreased Use of medical services has increased N/A. Do not use medical services *Recoded-Increase: Yes/No*
If your use of medical support services has changed, to what do you attribute the change?	*Open response*
Are you currently experiencing any physical injury or illness you are concerned about and that may negatively affect your performance but have not yet reported to your physician or medical services?	Yes No
If yes, why did you choose not to report it?	*Open response*
Mental Health Support Services Utilization	
In general, since your current assignment, has your use of mental health support services changed?	Yes No NA (have never used mental health support services)
If yes, how has it changed?	Use of support services has decreased Use of support services has increased
If your use of mental health support services has changed, what do you attribute the change to?	*Open response*
If you have concerns about your mental health, does the stigma of mental health problems prevent you from seeking care?	Yes No
Alternative Health Services Utilization	
Have you sought treatment from an alternative health provider (e.g., chiropractor, massage therapist, acupuncturist) for the medical condition(s) listed above while in your current assignment?	Yes No
If yes, has the frequency of treatment changed since your current assignment?	It has increased It has decreased *Recoded-Increase: Yes/No*
To what do you attribute the change?	*Open response*

Prescription Medication Utilization	
Has your use of prescription medication(s) changed since arrival at your current assignment?	Yes No
If yes, how has it changed?	It has increased It has decreased *Recoded-Increase: Yes/No*
To what do you attribute the change?	*Open response*
Over-The-Counter Medication Utilization	
Has your usage of over-the-counter medication changed since arrival at your current assignment?	Yes No
If yes, how has it changed?	It has increased It has decreased *Recoded-Increase: Yes/No*
To what do you attribute the change?	*Open response*

Note. * indicates response categories that were combined for analyses for current paper.

LIST OF ABBREVIATIONS AND ACRONYMS

CI	confidence interval
CRO	combat rescue office
CSAR	combat search and rescue
DNIF	duties not including flying
NHANES	National Health and Nutrition Examination Survey
NSDUH	National Survey on Drug Use and Health
OR	odds ratio
OTC	over-the-counter
PJ	pararescueman
USAF	U.S. Air Force